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Standard Guide for Measurement of Behavior During Fish Toxicity Tests¹

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1. Scope

1.1 This guide covers some general information on methods for qualitative and quantitative assessment of the behavioral responses of fish during standard laboratory toxicity tests to measure the sublethal effects of exposure to chemical substances. This guide is meant to be an adjunct to toxicity tests and should not interfere with those test procedures.

1.2 Behavioral toxicosis occurs when chemical or other stressful conditions, such as changes in water quality or temperature, induce a behavioral change that exceeds the normal range of variability (1). Behavior includes all of the observable, recordable, or measurable activities of a living organism and reflects genetic, neurobiological, physiological, and environmental determinants (2).

1.3 Behavioral methods can be used in biomonitoring, in the determination of no-observed-effect and lowest-observed-effect concentrations, and in the prediction of hazardous chemical impacts on natural populations (3).

1.4 The behavioral methods described in this guide include locomotory activity, feeding, and social responses, which are critical to the survival of fish (4).

1.5 This guide is arranged as follows:

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1.6 The values stated in either inch-pound or SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.7 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the*

responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use. While some safety considerations are included in this guide, it is beyond the scope of this guide to encompass all safety requirements necessary to conduct behavioral toxicity tests. Specific hazards statements are given in Section 7.

2. Referenced Documents

2.1 ASTM Standards:

E 140 Hardness Conversion Tables for Metals²

E 729 Guide for Conducting Acute Toxicity Tests with Fishes, Macroinvertebrates, and Amphibians³

E 1023 Guide for Assessing the Hazard of a Material to Aquatic Organisms and Their Uses³

E 1241 Guide for Conducting Early Life-Stage Toxicity Tests with Fishes³

E 1383 Guide for Conducting Sediment Toxicity Tests with Freshwater Invertebrates³

E 1604 Guide for Behavioral Testing in Aquatic Toxicology³

3. Terminology

3.1 *Definitions*—The words “must,” “should,” “may,” “can,” and “might” have very specific meanings. “Must” is used to express an absolute requirement, that is, to state that the test ought to be designed to satisfy the specified condition, unless the purpose of the test requires a different design. “Must” is used only in connection with the factors that relate directly to the acceptability of the test. “Should” is used to state that the specified condition is recommended and ought to be met if possible. Although the violation of one “should” is rarely a serious matter, violation of several will often render the results questionable. Terms such as “is desirable,” “is often desirable,” and “might be desirable” are used in connection with less important factors. “May” is used to mean “is (are) allowed to,” “can” is used to mean “is (are) able to,” and “might” is used to mean “could possibly.” Thus the classic distinction between “may” and “can” is preserved, and “might” is never used as a synonym for either “may” or “can.”

3.2 *Definitions of Terms Specific to This Standard:*

¹ This guide is under the jurisdiction of ASTM Committee E47 on Biological Effects and Environmental Fate and is the direct responsibility of Subcommittee E47.01 on Aquatic Assessment and Toxicology.

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² *Annual Book of ASTM Standards*, Vol 03.01.

³ *Annual Book of ASTM Standards*, Vol 11.04.